Department of Science and Agriculture

BARBADOS.

AGRICULTURAL JOURNAL

Vol. 4, No. 2. April, 1935.

ADVOCATE CO., LTD.,—Printers & Bookbinders to the Government of Barbados.

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DEPARTMENT OF SCIENCE AND AGRICULTURE.

STAFF.

Director of Science and Agriculture ..	R. W. R. Miller, B.A., (Camb.), A.I.C., Dip. Agric. (Cantab.).
Assistant Director	Vacant.
Geneticist	A. E. S. McIntosh, B.Sc., Ph.D., (Edin.).
Agricultural Chemist	S. J. Saint, M.Sc., Ph.D., F.I.C., (London).
Assistant to Professor of Chemistry ..	T. A. E. Barker, B.Sc., (London).
Lecturer in Natural and Agricultural Sciences	W. A. McD. Paterson, B.Sc.
Entomologist	R. W. E. Tucker, M.A. (Cantab.), B.Ed., (Capetown).
Veterinary Officer	Vacant.
Chief Analytical Assistant	C. A. Coppin, B.A.Sc., (Toronto), A.I.C.
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Fourth Field Assistant	F. E. Bynoe.
Analytical Assistant	H. A. Jones.
„ „	C. St. A. Alleyne.
„ „	L. A. Hall.
Botanical Assistant	L. H. Atkinson.
Foreman in Charge of Nurseries ..	S. A. Eastmond.

Mr. Miller was absent on duty leave from May 12th—May 20th, attending a meeting of the Advisory Committee of the B.W.I. Central Sugar Cane Breeding Station in Trinidad.

Mr. C. C. Skeete resigned the post of Assistant Director on 13th November to take up the appointment of Assistant Commissioner of Agriculture, Trinidad.

Dr. McIntosh was absent on duty leave from April 15th to 21st., investigating the sugar cane problems of St. Lucia; May 12th—June 27th, attending a meeting in Trinidad of the Advisory Committee of the B.W.I. Central Sugar Cane Breeding Station and afterwards visiting Jamaica to study the sugar cane problems of that island, and from September 29th—October 7th, surveying prospective cane areas in Grenada and making recommendations as to varieties to plant.

Mr. Paterson was absent on vacation leave from August 3rd—October 29th.

Mr. Tucker was absent on duty leave from May 23rd to June 22nd, 1934, in connection with the introduction from Antigua into Barbados of parasites of sugar cane pests.

Dr. Stoute who had been acting as Veterinary Officer was appointed Superintendent of the Public Market on the 7th of August, 1934.

BRITISH WEST INDIAN SUGAR CANE BREEDING STATION.

ADVISORY COMMITTEE.

Chairman	R. W. R. Miller, B.A., (Camb.), A.I.C., Dip. Agric. (Cantab.), Director of Science and Agriculture, Barbados.
Members	Sir Geoffrey. Evans,. Kt., M.A., C.I.E., Principal of the Imperial College of Tropical Agriculture.
	Hon. E. J. Wortley, O.B.E., Director of Agriculture, Trinidad.
	A. C. Barnes, B.Sc., F.I.C., A.M.I. Ch.E., Director of Agriculture, Jamaica.
	G. A. Jones, Dip. Agric. (Bangor), Commissioner of Agriculture of the Agricultural Advisory Department of the Imperial College of Tropical Agriculture.
Geneticist	A. E. S. McIntosh, B.Sc., Ph.D., (Edin.).
Assistant Botanist	G. C. Stevenson, B.A., A.I.C.T.A.
Field Assistant	J. M. Cave, D.I.C.T.A.
Statistical Clerk	A. D. Herbert, D.I.C.T.A.

BOARD OF AGRICULTURE.

The members of the Board of Agriculture, appointed for the Legislative Session, 1934—35, were as follows:—

The Honourable S. C. Thorne, M.L.C., Chairman.
The Honourable G. L. Pile, B.A., M.L.C.
Sir George Walton, Kt., M.C.P.
G. D. L. Pile, Esq., B.A., M.C.P.
G. C. Mahon, Esq., M.C.P.
Henry Alleyne, Esq., M.C.P.
H. A. Arthur, Esq., M.C.P.
E. S. Robinson, Esq.

The Director of Agriculture is an *ex officio* member of the Board.

REPORT ON THE WORK OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE.

For the Year Ending March 31st, 1935.

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SECTION I.

GENERAL.

NOTES ON THE SUGAR INDUSTRY, 1934-35.

The production from the crop reaped in 1934 was the second largest recorded in the history of Barbados (the largest being made in the previous year) and was made up as follows:—

	Long Tons of 2,240 lb
Dark Crystals (96°)	79,321.4
Muscovado	3,612.85
Other Sugars	..
Fancy Molasses*	28,500
Total	111,434.25

TABLE I.

SUGAR PRODUCTION 1930—1935.

Figures of Production in Tons of 2,240 lb.

	1930	1931	1932	1933	1934	1935 Estimate.
Production of all Sugars. ..	55,945	41,922	82,880	96,457	82,934	46,000
Fancy Molasses Manufactured *	27,768	21,610	19,535	20,718	28,500	31,000
Total	83,713	63,532	102,415	117,175	111,434	77,000

After three years of record production the sparsity of the rainfall and its unsatisfactory distribution have resulted in a greatly diminished crop, which although not yet complete will be in the neighbourhood of 75,000 tons. Twenty years ago a similar rainfall would have produced crops of approximately half this amount (1915—39,000 tons; 1920—48,000 tons; 1921—36,000 tons). In these days, however, prices were more in accordance with cost of production. At present prices plantations can only maintain their efficiency if crops of over 100,000 tons are made every year and for a great many plantations 1934-1935 will prove a very unsatisfactory year.

The price of sugar in Barbados at the end of March 1935 was 6s. 10½d. per 100 lb. of 96° dark crystals. Recent investigations have shown that over

*Equated at 330 wine gallons to the long ton.

a period of four years the average cost of production of a large number of estates in the colony has been slightly over £10 2s. 6d. per ton or 9s. 0d. per 100 lb. Fortunately, owing to the fact that there is a greatly increased demand for fancy molasses, the extra preference available will amount to approximately 2/4d. per 100 lb. making a total local price of 9s. 2½d. but this year's cost of production, owing to the low crop, will of necessity be much higher than the average of 9s. 0d. per 100 lb.

FANCY MOLASSES.

One of the results of the Ottawa Conference has been the greatly increased activities in the Canadian lumber and fishing industries with the result that the demand for Barbados fancy molasses has largely increased. Since the Conference, not only have considerable stocks of molasses been disposed of but there has been an increasing demand each year for the product. The manufacture of fancy molasses from 1928 has been, according to the exports:

1928	6,199,477	gallons
1929	6,317,435	„
1930	8,163,338	„
1931	7,131,148	„
1932	7,166,027	„
1933	7,589,813	„
1934	9,313,780	„

Considerable improvements have been made in the manufacturing processes and there is no doubt if the industry is handled judiciously that this valuable trade may be maintained for a considerable number of years. It has been stated, and is no doubt true, that it is only when the price of sugar is a low one that it is more profitable to manufacture fancy molasses than sugar and so the value of the molasses trade to the colony during the past few years of world depression and correspondingly low price of sugar can hardly be overestimated.

THE CANNING OF FANCY MOLASSES.

In 1932 the Legislature voted the sum of £170 towards the erection of a plant for the experimental canning of fancy molasses and the preliminary experiments showed that a suitable syrup or molasses could be manufactured. In order, however, to conduct extended experiments it would have been necessary to install a considerably larger plant and owing to the fact that unfavourable reports have been received as to the possibilities of marketing a canned fancy molasses in Canada it has been decided not to proceed at present with any further experimentation.

THE PURCHASE OF CANES BY FACTORIES.

The aim of the Department in the production of new varieties of sugar cane has been to obtain the maximum yield of sugar per acre and to this end seedlings giving high tonnages but low percentages of sucrose have been constantly rejected. Amongst the commercial canes which are now growing in Barbados there are varieties some of which are much

sweeter than others and which even though they produce a considerably smaller tonnage of cane yield a larger amount of sugar per acre. The practice has been for factories to purchase by tonnage of cane but in certain districts of the island the new variety, B.2935, will undoubtedly oust to a considerable extent the sweeter B.726 variety by reason of its superior yield unless the factories offer an additional inducement for the growing of B.726 by paying a higher rate per ton of canes.

SUGAR CANE VARIETIES PLANTED FOR THE REAPING SEASON OF 1936.

Each year, about October, the Department makes an individual recommendation to each plantation as to the varieties of sugar cane which it considers, given normal weather conditions, should succeed best for the particular place. These recommandations are determined by the sugar cane varieties available, the average rainfall obtained on the plantation and the personal knowledge of the departmental officers as to the conditions prevailing.

The following table summarises the recommendations made by the Department:—

DEPARTMENTAL PLANTING RECOMMENDATIONS—1934–36.

Parish.	B.H. 10(12)	B. 726	Ba. 12569	B. 2935	Total.
Christ Church	-	764¼	249¾	1,694½	2,708½
St. Philip ...	-	934¼	261¾	1,956½	3,152½
St. Michael ...	81¼	533¼	38¼	551¼	1,204
St. Lucy ...	-	380¾	173¾	1,074¾	1,629¼
St. Peter ...	249¾	645¼	15½	407	1,317½
St. Thomas ...	688	626	3½	170¾	1,488¼
St. Joseph ...	492¾	249½	-	-	742¼
St. George ...	450½	979½	-	424¾	1,854¾
St. Andrew ...	421¼	256¾	-	46½	724½
St. James ...	254	501¾	29	448	1,232¾
St. John ...	688½	621	-	92¼	1,401¾
Total ...	3,326	6,492¼	771½	6,866¼	17,456

Below will be found the actual planting record:—

SUMMARISED ACTUAL PLANTINGS 1934–36.

No. of Plantations or Plantation Groups.	Parish.	Total acreage planted.	B. H. 10 (12)	B. 726	B. 891	B. 417	Ba. 11569	B. 2935	* Misc.
31	Christ Church	2,709	31½	374½	30½	47	346	1,810½	69
30	St. Philip ...	3,145¾	2¼	727¼	34¾	51¼	252¾	2,046½	31
14	St. Michael ...	1,205	78	400¾	7	–	140	564¼	15
25	St. Lucy ...	1,634½	22½	231¼	5	15½	331	1,016	13
30	St. Peter ...	1,317½	207¼	451	28½	3	115	511¾	1
28	St. Thomas ...	1,488¼	780	398¼	–	–	11½	276¼	22¼
23	St. Joseph ...	742½	522	204	–	–	9¼	7	¼
33	St. George ...	1,854½	464½	964¾	15¼	6	31	342	31¼
14	St. Andrew...	724½	463¼	73½	–	–	106¾	72½	8½
20	St. James ...	1,232¾	141¼	377½	3½	–	72¾	621¼	16½
23	St. John ...	1,401¾	709	454¾	4¾	–	60½	167¼	5½
271	Total ...	17,456	3,421½	4,657½	129¼	122¾	1,476½	7,435¼	213¼

The 271 plantations or plantation groups include every plantation in the island and the fact that every planter submitted a return of the acreage planted in November—December 1934 is a striking testimony to the co-operation between the planting community and the Department.

A comparison of the recommendations and the actual plantings is of interest in the fact that 1,834 acres less of the B.726 variety was planted than had been recommended. This indicates that, if an average rainfall is experienced during 1935, a considerable diminution in sugar output will be recorded than if the recommended acreage of B.726 had been planted.

COTTON.

During the year a much greater interest in cotton has been observed throughout the British West Indies. Accumulated stocks of several years have disappeared and the very large crop grown in Montserrat during 1934 have been disposed of. While it is probable that a considerable pro-

* Miscellaneous made up as follows:—Experimental plots and mixed fields: 104¾; B.755:23½; B.381:49; B.663:4½; Ba.6032:10; B.6450:5; S.C.12/4:2; B.374;14½=108½.

portion of this cotton has been bought by spinners and is being held as invisible stocks there is no doubt that considerable quantities have been absorbed in the actual production of cotton materials. The outlook is distinctly brighter and the low price will undoubtedly prevent over-production, at any rate, in this colony. The formation of the British West Indian Sea Island Cotton Growers' Association has undoubtedly stimulated a fresh interest in the production of Sea Island cotton and there is a good prospect of a slightly better price for lint in the future.

The pink bollworm has not proved an economic trouble during the last growing season.

PEASANT AGRICULTURE.

The situation with regard to peasant agriculture is very much the same as it was last year. The Credit Societies, if not completely dead, are dormant and the formation of a Loan Bank has been delayed by various difficulties. It is, however, hoped in the near future that an Agricultural Instructor for peasants will be appointed and that a Loan Bank will be available to provide financial assistance to small holders in the cultivation of their crops. The hard year just experienced has been severe on the small cultivator whose agricultural methods are less adapted to withstand a drought than those of his larger neighbour.

SECTION II.

ADMINISTRATIVE AND EXPERIMENTAL WORK.

PEST CONTROL.

MOTH BORER OF SUGAR CANE.

During the period under review, in addition to the distribution during April—September, 1934, of ninety-one million parasites of the egg stage of the moth borer of sugar cane, *D. saccharalis,* it was found possible for the Entomologist to proceed to Antigua and there collect through the courtesy of the Antigua Government and the Local Sugar Planters' Association a nucleus for the breeding up of an additional parasite, *Lixophaga diatraea.* This parasite attacks the larval stage of the sugar cane moth borer and extensive breeding work is in hand to produce approximately twenty thousand of this parasite which should be ample for it to establish itself in Barbados if climatic conditions are suitable. The expenditure for this visit to Antigua was paid by the Planters of the colony.

THE DEPREDATIONS OF RATS.

During the year the Agricultural Society in co-operation with this Department conducted an extensive campaign against rats during the course of which over 300,000 barium baits were distributed. Government also furnished funds for the manufacture of 263 pounds of red squill baits for peasants and small holders. The campaign was apparently extremely successful as this year the damage to the sugar cane due to rats has been very considerably reduced The campaign however is being continued again to further diminish the damage.

MOSAIC DISEASE.

During the year, as reported elsewhere, 16,572 acres of sugar cane were inspected for the presence of mosaic disease and it is satisfactory to record that the situation with regard to this disease is stationary. Unfortunately, the noble sugar cane, *Saccharum officinarum,* to which all the commercial varieties grown in Barbados belong, exhibits a certain susceptibility to this disease, but considering the effective control under which it is held it is doubtful if any economical results would be obtained by replacing a certain proportion of the noble blood with other strains exhibiting a higher resistance. The service rendered by Government in the inspection for this disease is probably unique throughout the world when it is considered that throughout those parts of the island in which the disease is found practically every cane plant is inspected once or twice during the year. The total loss last year from the disease was about 9 acres of canes or approximately .024 per cent of the crop.

BANANAS.

Although it is not anticipated that the cultivation of bananas would ever become one of the staple industries of the colony, nevertheless there is a considerable local market for the Cavendish Banana, *Musa Caven-*

dishii, where irrigation can be practised, and in order to assist this industry, the Department has conducted, during the last six years, a series of experiments. The preliminary results show that there is a definite season during which bananas can be produced most profitably and a further experiment was laid down in April 1934 to determine whether it is possible to increase considerably the yield during the favourable period of the year. The further progress of this experiment will be published in due course.

VETERINARY SERVICE.

Under the Market and Butchers (Amendment) Act 1934 No. 25, the Veterinary Officer was appointed on the 7th of August, 1934, as Superintendent of the Public Market and there is no longer, as a consequence, any such officer in the Department. The comparative absence of disease amongst the stock of the colony and the presence of a number of qualified veterinary surgeons render the cessation of such an appointment possible without exposing the planting community to any considerable risk.

TEACHERS' COURSES IN THE PRINCIPLES OF AGRICULTURE.

For the third year in succession, the Lecturer in Natural and Agricultural Sciences, assisted by the technical officers of the Department, has conducted a successful course for school teachers. This course which lasts for two weeks is held during the Easter holidays and is designed to make nature teaching and study and the care of the school gardens of much more interest to both teachers and pupils than was the case formerly.

SUGAR CANE SPACING EXPERIMENTS 1933—35.

The experiments reported here constitute a continuation of sugar cane spacing experiments which were started in Barbados in 1929-31 and carried on during subsequent crop seasons.

The conclusions from these previous experiments, which were cited in previous Agricultural Journals,‡ were that "it would be profitable to adopt a "5′ x 2½′ spacing at the red soil centres, and a 5′ x 5′ spacing at the black soil "centres."

The experiments carried out during 1933-35 were designed to test these conclusions.

Three estates were selected to represent areas which are characterised by (1) low rainfall and black coral limestone soils (2) intermediate rainfall and black coral limestone soils and (3) high rainfall and red coral limestone soils. Such areas represent by far the majority of the sugar cane lands in Barbados.

Two spacings were tested at each estate i.e. (1) the standard spacing employed by the estate concerned and (2) the closer spacing which the above mentioned experiments had shown to be successful. The lay-out in each trial

‡ Sugar Cane Spacing Experiments. Agric. Jour., Dept. Sci. & Agri., Barbados, Vol. 2, Nos. 1 & 2, 1933 and Vol. 3, No. 2, 1934.

consisted of six randomised blocks and the plot size was approximately 1/24 acre. The standard variety for the district was planted in each experiment. At reaping, cane tonnages were ascertained as in previous years and, in addition, data on sucrose percentage in juice and cane number.

The results of the experiments are detailed below.

(1) Sandford Plantation. Variety B.2935. Representative of the low rainfall and black coral limestone soil area.

Rainfall for 1934	33.06"‡
Average annual rainfall for the district	43.00"
Standard spacing employed	6 x 6 feet.
Closer spacing tested against standard.....	5 x 5 „

Reaped 20/2/35.

RESULTS.

Feature.	Spacing. 6 x 6 feet.	Spacing. 5 x 5 feet.	Difference in favour of 5 x 5 feet.	Significance of difference*
(1) Tonnage of cane per acre ..	16.26	17.73	1.47	+
(2) Mean number of canes per plot ..	559	645	86	+
(3) Mean per cent sucrose in juice	15.44	15.69	0.25	—

The results show that the closer spaced plots significantly outyielded the standard spaced plots by approximately 9 per cent. This was accounted for by a significantly greater number of canes in the closer spaced plots. The closer spaced plots gave a higher per cent. sucrose in juice. This increase was not significant although, from the figures obtained it would appear to possess a fair degree of significance.

‡ This rainfall record is from an adjacent estate.

* A plus sign denotes that the difference has a 20 to 1 chance of being a real difference due to spacing. A minus sign denotes that the difference is not sufficiently great to be statistically significant.

(2) Lower Estate Plantation. Variety B. 726. Representative of the intermediate rainfall and black coral limestone soil area.
Rainfall for 1934 ..... — 40.90"*
Average annual rainfall for the district ..... — 56.00".
Standard spacing employed ..... — 5 x 5 feet.
Closer spacing tested against the standard ..... — 5 x 2½ „
Reaped 27/2/35.

RESULTS.

Feature.	Spacing.		Difference in favour of 5 x 2½ feet.	Significance of difference.
	5 x 5 feet.	5 x 2½ feet.		
(1) Tonnage of cane per acre	24.64	26.08	1.44	—
(2) Mean number of canes per plot ..	735	797	62	+
(3) Mean per cent. sucrose in juice	20.06	20.23	0.17	—

The differences in favour of the closer spaced plots in tonnage of cane and per cent. sucrose in juice just fail to reach those required for significance. Consequently, they are strongly suggestive of a real difference due to spacing.

(3) Mount Wilton ..... Variety—B.H.10(12).
Representative of the high rainfall and red coral limestone soil area.
Rainfall for 1934 ..... — 57.22".
Average annual rainfall for the district ..... — 70.00".
Standard spacing employed ..... — 5 x 5 feet.
Closer spacing tested against the standard ..... — 5 x 2½ „
Reaped 18/3/35.

RESULTS.

Feature.	Spacing.		Difference in favour of 5 x 2½ feet.	Significance of difference.
	5 x 5 feet.	5 x 2½ feet.		
(1) Tonnage of cane per acre ..	32.81	37.00	4.19	+
(2) Mean number of canes per plot ..	889	989	100	+
(3) Mean per cent. sucrose in juice	13.92	14.29	0.37	—

* This rainfall record is from an adjacent estate.

The closer spaced plots outyielded the standard spaced plots by approximately 13 per cent.

The better juice quality of the closer spaced plots just failed to give the necessary odds for significance.

From the fact that by far the greater number of closer spaced plots in all the experiments gave a better juice quality, it would appear that the difference is real and not alone due to chance.

GENERAL REMARKS.

It can be seen from the figures that the year 1934 was one of unusually low rainfall; the rainfall at each plantation being appreciably below the average for the district for the past twenty years. It is reasonable to consider that this feature would act more adversely on the closer spaced than the wider spaced plants. Despite this, the former outyielded the latter. In addition, the closer spaced plants tended to give, in these early reaped experiments, a higher sucrose per cent in the juice. This feature was also noted in the first spacing experiment. *

The closer spacing definitely gives a higher number of canes per acre. Applying the findings from sugar cane growth measurements made in Barbados on standard varieties to the spacing experiments, it would appear that the cane stool formation is earlier in the closer spaced plants, and late cane formation is lower. These features would help to account for the earlier ripening in the closer spaced plants.

CONCLUSIONS.

The closer spacings employed, together with the early reaping dates of these experiments, are shown conclusively to increase plant cane tonnages. Further, it can be stated with a fair degree of confidence that closer spacing tends to hasten ripening.

In these spacing experiments, the effect of closer spacing on the drying out of canes during crop and so on cane tonnages, has not yet been fully determined.

Further, ratoon spacing experiments are necessary before definite conclusions can be drawn as to the effect of closer spacing on ratooning.

Finally, any alteration in spacing methods involves changes in costings and it would appear desirable that the final conclusions from these small scale experiments be tested on a plantation scale where accurate costings could be made.

THE CO-OPERATIVE PRODUCE MARKETING ASSOCIATION.

During the past twelve months, an additional business for the retailing of vegetables has been started in the colony with the result that, while more vegetables, ground provisions and fruit have been sold by the Association than

* Ann. Rpt. Dept. Sci. & Agric., Barbados, 1930—31, p.41 et seq.

during the preceding period, prices have been so low that only a bare profit can be recorded. The Association has undoubtedly proved of great benefit to the small producers but it is regretted that the numbers of these producers are not increasing as rapidly as they should nor can this be expected until an Agricultural Instructor has been appointed.

THE BRITISH WEST INDIES CENTRAL SUGAR CANE BREEDING STATION.

During the year one meeting of the Advisory Committee was held in Barbados. It is gratifying that the Director of Agriculture of Jamaica was able to attend and take part in the discussions.

The future of the Station appears now to be assured, as for the financial year October 1935 to September 1936, the Colonial Development Fund, it is understood, will make a grant of £2,000 and for the next year £1,000; the Sugar Manufacturers' Associations of Jamaica and of Trinidad and the Governments of Trinidad and of the Windward and Leeward Islands have agreed to contribute £1,000 during 1936—37 and the full amount of £2,000 afterwards.

Consequent on the resignation of Mr. H. L. Manning who accepted the post of Assistant Agricultural Officer in Montserrat, Mr. J. N. W. Niccolls was appointed to act as Statistical Clerk from April 1st to May 31st, 1934, and Mr. L. H. Atkinson from June 1st to August 31st, 1934. Mr. A. D. Herbert was appointed to fill the vacancy on September 1st, 1934.

MR. C. C. SKEETE.

During the year under review, Mr. C. C. Skeete, Assistant Director of Agriculture, was appointed Assistant Commissioner of Agriculture in the Agricultural Advisory Department of the Imperial College of Tropical Agriculture, Trinidad.

It is desired to place on record the very deep appreciation of Mr. Skeete's work in Barbados. Mr. Skeete was very largely responsible for the organisation of the Department of Science and Agriculture in 1925 and his many services to the Department have been greatly appreciated.

OBITUARY.

MR. G. O. BATSON.

Mr. Batson who died on April 19th, 1934, had served for twenty-three years in the Sugar Polarisation Room, under Professor d'Albuquerque. On the formation of the new Department in 1925, Mr. Batson was appointed Senior Sugar Analyst which position he occupied until his untimely death.

ENTOMOLOGICAL.

REPORT ON ENTOMOLOGICAL SECTION FOR YEAR ENDING MARCH 31ST, 1935.

By R. W. E. TUCKER, M.A., B.Ed.

Entomologist.

The main points of interest in the year under review are the introduction of *Lixophaga diatraea* from Antigua, and its mass breeding and liberation in Barbados for the control of *Diatraea saccharalis*, and the large scale introduction of the predaceous larvae of *Pyrophorus luminosus* from Porto Rico (known there as Cucubano) for the control of *Lachnosterna smithi* (the Brown Hardback).

In experimental field work on *D. saccharalis* and its egg parasite *Trichogramma minutum*, and its various egg predators and other mortality factors, also on its relation to different varieties of cane, interesting data were obtained showing the changes brought about by a season of prolonged low, or absence of, rainfall when compared with the preceding year of more normal rainfall.

Small Moth Borer.—Diatraea saccharalis.

From the middle of February to the end of September, 1934, a total of 91,515,600 *Trichogramma* was distributed throughout the canefields. The reduction in numbers liberated is due to a primary parasite of *Sitotroga* namely *Habrocytus cerealella* gaining access to the moth breeding units, and causing considerable losses in moth production, and also to the adverse effect of long continued dry weather. The control exerted by *Trichogramma* was therefore adversely affected by the drop in numbers distributed, and by the effect of prolonged dry weather in the field on the efficacy of this parasite, for it is known that a lowering in general humidity is far more detrimental to *Trichogramma* than to its host *Diatraea*.

A lowering of average parsitism by *Trichogramma* was shown by experimental plot records, and though the same plot records showed an increase in larval mortality, other factors due to the climatic differences caused by shortage of rain also came into effect, and the resulting balance of *Diatraea* infestation, and its effect on a crop of altered growth, due to rain shortage during the critical growth period, and late incidence of rain, is difficult to assess.

It was anticipated however from plot data that the net result would be a diminution in field loss due to canes killed or broken in half by borer attack because of the late incidence of the attack, and the short and late growth of canes; but that factory analyses of canes would show an increase in the percentage of internodes damaged by borers. The first point has proved to be correct, in that field loss has diminished from 10.11% to 9.38% of total loss of cane; average in-

festation of cane joints is anticipated to be around 16% or 17%, ‡ instead of 13.6% as in 1934.

The results of experimental plot records, and of field and factory records, on the effects of *Trichogramma* liberations for the year under review, give adequate support for the efficacy of control by *Trichogramma* despite the biological complications caused by an abnormally dry season up to October 1934, and despite alterations in normal cane growth from the same cause.

Experimental plot records made throughout 1934 on extent of egg deposition, rate of larval mortality, extent of colonised and uncolonised parasitism, effect of egg predators, and on effect of cane variety on rate of egg deposition and final *Diatraea* infestation have given interesting information on the effect of the above noted abnormally dry conditions, on the factors stated, which will be published later on.

The determination in experimental plots of the various mortality factors which affect *Diatraea saccharalis* together with knowledge of the rate of egg deposition month by month and also of the number of cane shoots per stool in each month has enabled calculations to be made of the amount of borer damage to be expected at any given time in the field. The theoretical figures so obtained agreed sufficiently closely with actual field determinations, to indicate that the data on which the calculations were based were reasonably accurate. Two papers on analysis of field data have been published and others are in preparation.

In accordance with previous definite statements on control of *D. saccharalis* in Barbados, reliance is not placed entirely on *Trichogramma* work, but the introduction and establishment of *Lixophaga diatraea* has always been contemplated, but has awaited the time when it could be accomplished in a thorough fashion.

This was made possible in 1934 when the Entomologist visited Antigua during May and June for the purpose of obtaining a supply of *Lixophaga* which had been introduced into Antigua from Cuba. Altogether 72 of these parasites were obtained during the above visit, from which laboratory inoculations in Antigua resulted in 735 flies being obtained. These were bred up in Barbados, and a total of 3,229 fertile females and 851 males were liberated between July 7th and October 6th, 1934. Mass liberation then ceased for 1934, but a strong laboratory colony was maintained, for an early start in 1935. From the surplus of each cycle of this colony, some hundreds of additional *Lixophaga* were placed out in the field, to augment the above liberations.

In March 1935, large scale breeding work on this parasite was built up, and it is hoped to liberate up to 20,000 *Lixophaga* in the young canefields.

It is too early to say whether the 1934 liberations have secured an unassailable foothold in Barbados; a few scattered recoveries have been made in the

‡ The final figure for twelve factories worked out at 17.06% joints bored, the worst infested cane being B.H.10(12) with an average infestation of 20.85% joints bored.

field, but no attempt will be made to assess this parasite until the 1936 young crop at the earliest.

All liberations of *Lixophaga* were made in the hillier, wetter areas of the island.

At the same time, the parasite *Paratheresia claripalpis* was introduced from Trinidad, through the kind services of Mr. F. W. Urich, of the Imperial College of Tropical Agriculture, for breeding and liberation in the coastal, dry areas of Barbados. Unfortunately, the laboratory mass breeding of this fly was not successful; possibly because the fly was given the same routine treatment as *Lixophaga*. The liberations of *Paratheresia* were therefore too small for results to be expected, but it is hoped to repeat the introduction, and give this parasite undivided attention.

Root Borer of Sugar Cane.—Diaprepes abbreviatus.

No further introductions of parasites have been made against this pest, and control still rests on cultural and mechanical methods. It is considered that these methods have resulted during the past six years in a diminution of *D. abbreviatus* and a lessening of the visible damage associated with it.

This is possibly a contributory cause to the considerable increase in ratooning now practised in Barbados.

Brown Hardback.—Lachnosterna smithi.

No search has yet been made for the Scoliid parasites introduced in 1934 from Porto Rico, but routine observations of Cordia bushes and wayside food plants such as *Stachytarpheta* have not revealed the presence of any adults.

The year under review, however, saw the large scale introduction of *Pyrophorus luminosus* larvae from Porto Rico to Barbados. This was made possible by the kind co-operation of Dr. G. N. Wolcott, of the Insular Experiment Station, Rio Piedras, who obtained and shipped to Barbados a total of 3,670 Cucubano, as these larvae are called.

Some difficulty was experienced in finding canefields which contained sufficient brown hardback larvae, in the wetter, hillier areas (suitable to *Pyrophorus*) in which to put out the imported predaceous larvae. Each larva was however eventually placed out with an adequate food supply.

Scarabee.—Euscepes batatae.

During the year under review a systematic study of the life history and field habits of this serious pest of sweet potatoes has been put in hand.

Life history and seasonal variation in egg laying (if any) are being investigated by laboratory experiments.

Field experiments are based (1) on monthly determinations of the number of live scarabee larvae which can be found in potato slips suitable for planting, taken from known infested fields and from random fields. This will indicate the pos-

sibilities of infesting fields with planting material, (2) on the possibilities of dipping such slips in larvicidal and ovicidal solutions without killing the slips, retarding their establishment or growth, or inhibiting the formation of tubers, (3) on the possibility of, and extent of, living adult scarabee beetles remaining in the soil after the removal of infested potatoes therefrom, (4) on the powers of flight or other methods of distribution of, and infestation by, scarabee, (5) on the effect of different varieties of sweet potato on final infestation.

It is hoped from these experiments to amplify or modify recommendations already given for the cultural control of this pest.

PESTS OF TOMATO.

In addition to the usual lepidopterous pests of this crop, there have been considerable setbacks in some areas and some fields due to a small midge‡ which causes considerable damage to, and premature shedding of, tomato flowers, and which damages and deforms fruit which sets.

There was also an increase in the incidence of Tomato Erinose, due, it is considered, to the presence of the mite *Eriophyes cladopthirus*. Usually, the damage due to this pest does not develop until late, and is not serious unless seed beds become infested, and fields are planted out with infected plants; in this case, total loss may result.

Other Insect Pests.

Routine identification of insect specimens sent in, and advice on field and garden pests have continued as usual.

Rat Control.

Though not strictly an entomological problem, assistance was given during the year under review in the carrying out of a campaign against rats by means of barium and squill baits.

The examination of standing cane in a portion of 69 fields this year during moth borer estimates has shown considerably less damage compared with similar observations in 1934, which confirms the general opinion of Planters that the 1934 rat campaign was productive of beneficial results.

Parasites to Porto Rico.

At the request of Dr. G. N. Wolcott, consignments of the cane mealy bug predator *Hyperaspis trilineata* were sent to Porto Rico during the year under review.

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‡ This *Cecidomyiid* has not yet been identified but it may possibly be *Contarinia lycopersici*, which causes similar damage to tomatoes in St. Vincent.

CHEMICAL.

REPORT OF CHEMICAL SECTION.

By S. J. SAINT, M.Sc., Ph.D., F.I.C.,

Agricultural Chemist.

I. Analytical Work.

A. FOOD AND DRUGS LABORATORY.

B. SUGAR LABORATORY.

C. ANALYSIS OF SEEDLING CANES.

II. Investigational and Advisory Work.

A. SUGAR TECHNOLOGY.

B. SOILS.

C. MANURING.

I. ANALYTICAL WORK.

A. FOOD AND DRUGS LABORATORY.

The total number of samples examined in this laboratory for the various Government Departments and for private individuals during the year was 1,192.

The number and distribution of samples dealt with annually for the past four years is set out in Table I.

TABLE I.

	1931.	1932.	1933.	1934.
1. Police Department	283	417	236	317
2. Customs Department ..	331	137	197	212
3. Public Works Department ..	6	8	12	26
4. Agricultural „ ..	35	4	241	147
5. Sanitary „ ..	..	10	6	17
6. Agricultural Society ..	203	328	254	236
7. Other Government Depts. ..	14	7	18	5
8. Private Individuals ..	284	364	295	232
Total	1,156	1,275	1,259	1,192

Fuller particulars of the various samples analysed in the Food and Drugs Laboratory for 1934 are as follows:—

1. Police.

Viscera and examinations for poisons	26
Coins and counterfeit exhibits	81
Milks	50
Rums	84
Butters and Margarines	26
Cocoa and cocoa essences	17
Tea	12
Miscellaneous	21
Total	317

Notes.

Viscera.

Nitro-benzene.—Two cases of poisoning by nitro-benzene were dealt with during the year. In one case 4½ grains of nitro-benzene were isolated from the stomach contents and in the other case 80 grains of nitro-benzene were separated.

Nitro-benzene or Oil Mirbane is used in conjunction with chlorate of potash as an explosive and cases of poisoning which usually arise as a result of drinking nitro-benzene in mistake for some other liquid occur each year. It was suggested in last year's report that bottles containing nitro-benzene should be labelled "Poisonous" and stored in a safe place.

Arsenic. Samples of vomit from five persons alleged to have been poisoned were examined. All samples contained arsenic; from one sample 1/16 grain arsenious oxide and from another 1/30 grain arsenious oxide were isolated. In connection with this case samples of water, cotton seed oil and cooked food were analysed. The water and cotton seed oil were free of arsenic but the cooked food was found to contain 18 grains of arsenious oxide.

Crude Petroleum. Samples of viscera were examined for poisons, and two fluid ounces of crude petroleum oil were separated from the stomach contents. No other poisonous substances were detected and the opinion was expressed that deceased must have drunk sufficient crude petroleum to cause death.

Bismuth. Samples of viscera submitted in connection with a suspected poisoning were examined but no poisonous substances could be detected in the solid viscera. Bismuth was isolated from the contents of the stomach and intestines but this had been administered in hospital for X-ray examination purposes.

Food, etc., suspected of containing poisonous substances.

Cocoa. A cup containing the dregs of cocoa were examined and 7½ grains of finely powdered glass were isolated.

Water. A sample of water was found to contain one grain of laundry blue.

Various other samples of foodstuffs were examined but no poisonous or other harmful substances could be found in them.

Coins and Counterfeiting Exhibits.

The number of counterfeit coins and counterfeiting exhibits received for examination was very much greater than in previous years. Altogether, 54 coins were submitted and 39 proved to be counterfeit. The exhibits consisted chiefly of pieces of metal alloys similar in composition to the coins and plaster of paris moulds.

Milks.

Fifty samples of milk were received for analysis as compared with 84 samples for 1933 and 270 for 1932. Of the samples received 20 (or 40%) were found to be adulterated.

Rums.

Eighty-four samples of rum were examined and, of these, only eight were found to be below the statutory limit of 25 degrees under proof.

Butters and Margarines.

All of the 26 samples of butter and margarine were found to contain less than 16% water.

Cocoa and Cocoa Essences.

The standard adopted in these examinations is that cocoa should contain not less that 20% cocoa fat whereas cocoa essences should contain between 10 and 20% cocoa fat. In five cases, cocoa essences were sold as cocoa.

Tea.

All samples submitted for analysis were of satisfactory quality.

Miscellaneous.

These samples included flour, cheese, cornmeal, coffee and sago; all of which were found to be satisfactory as foodstuffs.

2. Customs.

Petroleum	144
Condensed milk	16
Butter and margarine	42
Miscellaneous	10
Total	212

Petroleum.

These samples consisted chiefly of kerosene oils for flash point determinations and petrols for specific gravity determinations. All the samples of kerosene oil had flash points well within the limits prescribed by the Petroleum Act.

Condensed Milk.

Of the samples examined three were found to contain less than 9% fat and were classified accordingly under the Customs Tariff Act.

Butter and Margarine.

All the samples contained less thon 16% water which is the statutory limit under the Food and Drugs Act.

Miscellaneous.

Various samples such as essences, lotions and preparations containing alcohol were received for analysis and an expression of opinion as to classification under the Customs Tariff Act.

3. Public Works Department.

Water	18
Fuel Oil	3
Miscellaneous	5
Total	26

Water.

Analyses of the water supplied to the Public were carried out periodically during the year. The analyses showed a high chemical organic purity.

Fuel Oil.

Samples of oil as used at the various pumping stations were analysed and found to be up to the guaranteed specification.

Miscellaneous.

These samples consisted chiefly of boiler deposits received for analysis and report.

4. Department of Agriculture.

One hundred and twenty samples of young cane shoots were received for moisture determinations in connection with experiments on the varietal resistance of sugar cane to moth borer attack.

Rat baits were examined periodically for barium to check the accuracy of mixing.

Miscellaneous samples included gasolenes, fertilizers and lime juices.

5. Sanitary Department.

Preserved fish and meat	7
Condensed milk	1
E. C. Disinfectant	9
Total	17

All samples of preserved fish and meat received for examination were found in a condition fit for human consumption.

The sample of condensed milk was condemned.

Periodic analyses were made of the free chlorine content of the E.C. Solution manufactured by this Department. A good quality disinfectant was maintained.

6. Agricultural Society.

Feeding Stuffs	68
Fertilizers	32
Sugars and Molasses	136
Total	236

Feeding Stuffs and Fertilizers.

These samples were received from the Official Samplers of the Agricultural Society and were analysed under the Fertilizers and Feeding Stuffs Act. All samples were found to be unadulterated and to correspond closely with their guaranteed analysis.

Sugars and Molasses.

These samples were analysed in connection with the prize awards of the Annual Industrial Exhibition. A detailed report of the results of the examination was submitted to the Agricultural Society.

7. Other Government Departments.

Mental Hospital	4
Government Industrial School	1
Total	5

Mental Hospital.

Four samples of water from the well at the Hospital were examined and found chemically pure.

Government Industrial School.

One sample of oilmeal (linseed cake meal) was submitted for analysis and report. It was found to be of good quality.

8. Private Individuals.

Analyses are carried out for private individuals for which fees are charged by Government, in accordance with the scale set out in the Schedule to the Department of Science and Agriculture Act.

The following analyses were carried out during the year:—

Cane Juices	63
Sugars and Syrups	76
Waters	9
Hydrometers for checking	13
Petroleum Oils	3
Fertilizers	26
Feeding Stuffs	4
Alcohols	4
Butter and Margarine	3
Miscellaneous	31
Total	232

The fees receivable by Government for these analyses totalled £73. 8. 0. for the year.

B. SUGAR LABORATORY.

All sugars, fancy and choice molasses sent to Bridgetown from the factories are sampled and the samples are analysed in this laboratory. This analysis serves as a basis in assessing the price paid by the buyer to the manufacturer.

As this laboratory has been organised and run as a commercial undertaking by the Government, particulars of the number of samples, expenditure and revenue are given in Table II for the past six years.

Table II.

Year.	Number of Samples.		Expenditure.			Revenue.			Excess of Revenue over Expenditure.		
	Sugar.	Molasses.	£	s.	d.	£	s.	d.	£	s.	d.
1929–30 ..	29,978	8,114	868	0	0	1,904	12	0	1,036	12	0
1930–31 ..	20,181	9,899	798	0	0	1,504	0	0	706	0	0
1931–32 ..	18,141	9,712	715	0	0	1,392	13	0	677	13	0
1932–33 ..	25,916	8,194	761	0	0	1,705	10	0	944	10	0
1933–34 ..	36,669	10,947	797	0	0	2,380	16	0	1,583	16	0
1934–35 ..	18,071	10,092	600	0	0	1,408	3	0	808	3	0

C. ANALYSIS OF SEEDLING CANES.

In connection with the genetical work and manurial trials carried out by the Department of Agriculture representative samples of cane are sent in for analysis.

During the year, 2,511 bundles of cane were milled in the Machinery Room and the expressed juice analysed; where the composition of the whole cane was needed, analyses were made of the megass.

II. INVESTIGATIONAL AND ADVISORY WORK.

A. SUGAR TECHNOLOGY.

A large number of advisory visits were made to Dark Crystal, Muscovado and Fancy Molasses Factories during the year.

An improved factory method for the manufacture of fancy molasses was developed and introduced on a large scale and yielded very satisfactory results.

The scheme for the introduction of chemical control into the smaller vacuum pan factories was continued for the third successive crop season. There is no doubt that this scheme has enabled these smaller factories to obtain better results and recoveries.

An investigation has been made of the conductivity method of pan boiling control using a Cuitometer. Through the kindness of Hon. G. L. Pile the experimental work was carried out at Bulkeley Factory and mention must be made of the ready assistance rendered by Mr. Carrington, the manager. The results of this investigation will be published in the Journal at a later date.

Forty-nine samples of fancy molasses which had been manufactured at different types of factory were examined with the object of evolving a chemical test which would detect any differences which might exist between such molasses. Analyses were made of the sulphate, copper and iron content.

The normal sulphate content of Barbados fancy molasses due to the sulphates naturally present in cane juice would appear to vary from 0.20—0.27%. The addition of sulphuric acid during the manufacturing process in order to assist inversion raises the sulphate content of the molasses to between 0.30 and 0.37%.

The copper content of the fancy molasses under consideration varied between one and fourteen parts per million. There appeared to be some correlation between the copper content of the molasses and the number of copper vessels used in the boiling of the juice. The results show, however, that there are other factors which affect the relationship.

The iron content of these samples of fancy molasses varied between eight and two hundred parts per million. It appeared that the type of boiling apparatus and the degree of acidity of the syrup influenced the iron content. It cannot be said that the results so far obtained enable one, from the analyses of the molasses, to pick out the type of factory manufacturing such molasses.

B. SOILS.

The data which had been accumulated on the coral limestone soils of Barbados were written up and published in the Journal during the year.

On the basis of this soil survey, samples of plantation soils are taken on request and advisory reports are issued giving manurial and other recommendations.

The investigation into the nitrogen status of arable soils, without vegetation, has been continued. Samples of soil representative of black, red, St. George's Valley and red sand soils have been taken weekly and determinations of moisture, nitrate, ammonia and total nitrogen have been made.

C. MANURING.

Additional manurial trials have been undertaken during the year on sour grass and sugar cane and the detailed results have been published in a previous issue of this Journal.

On the basis of the results of the manurial trials carried out to date, the following recommendations are made for the manuring of sugar cane under Barbados conditions.

These recommendations, as far as can be judged at present, represent the methods of manuring sugar cane which will give the maximum yield of cane at the minimum cost on average land and under average climatic conditions.

I. PLANT CANE.

A. Without Pen Manure.

Cover down the surface of the soil with trash, sour grass, bush etc. before the commencement of the dry season.

As early cane manure, apply 2—2½ cwts. per acre of a mixture of three parts sulphate of ammonia and five parts muriate of potash in or about January.

When the rainy season commences, apply 2—2½ cwts. per acre of sulphate of ammonia.

B. With Pen Manure.

Apply 1—1½ cwts. per acre of the 3:5 mixture recommended in I A. as early cane manure in or about January.

Apply 2—2½ cwts. per acre of sulphate of ammonia when the rains commence.

II. RATOONS.

Apply 2—2½ cwts. per acre of the 3:5 mixture recommended in I A. as soon as possible after the plant cane is cut.

Apply 4 cwts. per acre of sulphate of ammonia when the rains commence.

REPORT ON PLANT BREEDING AND SEEDLING TESTING.

By A. E. S. McINTOSH, B.Sc., Ph.D.

Geneticist.

I. **Sugar Cane.**

A. SUGAR CANE BREEDING, SEEDLING RAISING AND TESTING.

B. SPECIAL INVESTIGATIONS.

II. **Sweet Potato.**

A. SEEDLING TESTING.

B. VARIETY TRIALS.

I. SUGAR CANE.

A. SUGAR CANE BREEDING, SEEDLING RAISING AND TESTING.

Sugar Cane Breeding was carried out at Lion Castle during October, November and December, 1934.

Seedlings were derived from crossing only. Male sterile varieties were used as mother parents, and foreign pollen was excluded from their arrows, as in previous years by the use of arrow lanterns.

The extent and nature of the crossing work is shown below:—

(a) Crosses between "noble" varieties (*Saccharum officinarum*)	
(1) between Barbados varieties	18
(2) between Barbados and imported "noble" varieties	2
(b) Cross between Barbados variety and *Saccharum spontaneum* (Coimbatore form)	1
(c) Crosses between Barbados varieties and *Saccharum spontaneum* nobilisations (Kassoer and Toledo)	
(1) second nobilisation	3
(2) third nobilisation	4
(3) fourth nobilisation	26
(4) fifth nobilisation	7
Carried forward	61

Brought forward	61
(d) Crosses between Barbados varieties and *Saccharum barberi*. (Hemja and Hathooni)	2
(e) Crosses between Barbados varieties and *Saccharum barberi* nobilisations (P.O.J's 213, 234, 2379 & Co. 213).	
(1) second nobilisation	3
(2) third nobilisation	2
(f) Crosses between Barbados varieties and *Saccharum sinense* (Uba)	2
(g) Crosses involving *Saccharum officinarum, S. spontaneum and S. barberi* blood	7
	77

The majority of the crosses in the nobilisation series represent back-crosses between previously acquired seedlings to Barbados varieties.

Saccharum spontaneum (Coimbatore form), Uba (two forms) and Kassoer were used for the first time, with the object of starting new nobilisation series, from which seedlings will be selected for suitability to British West Indian conditions.

SUGAR CANE POTTING AND PLANTING OUT.

Approximately twenty thousand seedlings were potted during January and February, 1935, from the seedlings obtained in the breeding work.

Pottings were allocated as follows:—

(a)	Proven crosses	5	:	seedlings potted		7,216
(b)	Semi-proven crosses ..	7	:	„ „		4,016
(c)	Experimental crosses ..	52	:	„ „		8,749
	Total					19,981

The proven crosses consisted of seedlings from crosses which had previously been shown to produce populations of a high standard.

The semi-proven crosses were those which had not yet been tested, or had been tested insufficiently, but which were considered distinctly promising as producers of good seedlings.

Both the proven crosses and the semi-proven crosses were between noble canes.

The Experimental Crosses consisted of seedlings from crosses whose value as seedling producers was unknown.

A new scheme of first year seedling trial was started for the first time. This scheme involves establishing the seedlings in a field nursery in March and April, and planting the first year seedling block in November with cuttings obtained from this nursery and reaping them in the next crop season but one. The object of this procedure is to allow the seedlings a full growing season in their first trial so that selections from them will represent seedlings most suited to British West Indian growing conditions. Previously, the first trial extended from planting in April to the subsequent crop, and the tendency was to select short season types of seedlings which, as a rule, performed relatively best over this short testing season. This was especially so among nobilised seedlings and it is obviously desirable to avoid selecting such seedlings.

Planting of seedlings in the nursery was begun in March 1935. Seedlings were closely spaced (3 to the cane hole) and no special layout was necessary, as the nursery stage is not intended to represent a test between populations. Seedlings from each cross were planted in blocks.

Approximately twelve thousand seedlings will be planted in the nursery, and this number will be reduced by a minor elimination in November 1935 to approximately ten thousand, which will be planted in the first year seedling trial.

These will be reaped in 1937, and thus constitute the B.37′ series of seedlings.

FIRST YEAR SEEDLINGS—B.35′ SERIES: REAPED 1935.

These were bred in 1933, planted out in 1934 and reaped in 1935.

As in 1934, there were three distinct groups:—
(1) Proven crosses—Early Group.
(2) Proven crosses—Late Group.
(3) Experimental crosses (Trial Marriages).

The first group was reaped in February and the third in March. The second group will be reaped in May.

The proven crosses were regarded as the chief media for supplying seedlings for further trial. At reaping, field and laboratory data were taken for field selected seedlings only.

In the Experimental Crosses, the usual data was taken for each seedling at reaping in order to assess the value of the individual crosses as seedling producers. While certain selections of noble variety parentage in the Experimental Crosses may be included in the routine Second Year Trials in Barbados, the majority of the selections here are seedlings possessing a greater or less degree of wild blood. These selections are made for ultimate trial under those British West Indian sugar cane areas which have seedling requirements distinct from those in Barbados.

A preliminary trial of forty seedlings selected from this group in 1934 was planted at Codrington in November 1934. This will be reaped in 1936, and promising seedlings will be sent to the Central Quarantine Station in Trinidad for subsequent distribution to and trial in such areas.

SECOND YEAR SEEDLINGS.—B.32′ SERIES: LATE GROUP.

These were reaped at Dodds in March, and the corresponding trial in the high rainfall district will be reaped at Todds in May.

SELECT SEEDLING TRIALS.

These were conducted to test the merits of the B.31′ series of select seedlings, namely B.3124, B.3125, B.3127, B.3138 and B.3179. The seedling B.3013 was also included in these trials. The results so far obtained (i.e. from the "early" group) would indicate that, while all these seedlings yield close to the standard commercial varieties, none is sufficiently outstanding to suggest its replacing any of the standard varieties.

VARIETY TRIALS.

No plant cane variety trials were reaped. A series of trials in the intermediate and high rainfall districts was laid out to test the promising varieties B.3013 and B.3234 against the standard varieties B.H. 10(12) and B.726. These will be reaped in 1936.

Four of the variety trials, reaped as plant canes in 1934, were ratooned. The object of these was to test B.2935 against Ba.11569, B.726 and B.891 in the low rainfall district. The ratoon yields which were available indicated that the variety B.2935 gave a satisfactory performance as first ratoons under the conditions obtaining.

B. SPECIAL INVESTIGATIONS.

MATURITY EXPERIMENTS.

Maturity Experiments were carried out at Codrington and Wakefield, the stations being representative of the low rainfall and high rainfall districts respectively. The objects of these experiments, their layout and treatment have been noted in previous reports.

Valuable data is being accumulated from the results of these experiments for a range of varieties, including both Barbados seedlings and imported varieties. Particular attention is paid to analyses of the factors contributing to cane yield and juice quality throughout the crop season, and to the effect of variety, cane type and environmental conditions on rotting and drying out of canes.

The results have direct application in the breeding work, in that they reveal the nature of the desirable varietal characteristics for different rainfall areas and times of reaping.

GROWTH MEASUREMENTS.

These, as in previous years, were carried out in the plots of the Maturity Experiments at the high and low rainfall stations. A full account of the methods employed in these experiments has been published in the Agricultural Journal, Vol. 3 No. 1.

In the routine scheme of seedling trials, the select seedlings are included in the maturity experiments each year. The growth measurements which are conducted on the seedlings at this stage have considerable value in determining their growth types, and in assessing their merits at a comparatively early period of their trials.

Measurements were begun in March on the B.32′ series of select seedlings —viz: B.3216, B.3234 and B.3239, together with the standard varieties— B.H. 10(12), B.726 and B.2935, at both low and high rainfall stations. Allocations for ratoon measurements to be begun in the near future at Wakefield are as follows:—B.H. 10(12), B.726, B.3013, B.3125, B.3127 and B.3138.

ROOT SYSTEM INVESTIGATIONS.

This work is being carried out as one of the special investigational studies of the British West Indies Central Sugar Cane Breeding Station.

The first investigation of the series, which involved a study of the root development of the varieties B.H. 10(12), Ba.11569, B.726, P.O.J. 2878 and Co.281 under one environment, was concluded in June 1934. A detailed account of this investigation was published as Bulletin No. 5 of the British West Indies Central Sugar Cane Breeding Station.

Information was obtained on features of quantitative and qualitative root development, and on the relationships between root characters and such features as tillering, length of vegetative life of individual canes and drying out of canes during the crop season.

A second investigation was begun in January, 1935, which will be a repetition and an extension of the first one. The varieties included are B.H. 10(12), Ba.11569, B.2935, B.726, P.O.J. 2878, Co. 213, Uba and *Saccharum spontaneum*, and the experimental procedure will be the same as before, with certain modifications. Particular attention will be paid to the absorbing zone of the root systems, and to the relationships between root development and the development of the above-ground parts in its varietal aspect.

At the suggestion of the Advisory Committee of the British West Indies Central Sugar Cane Breeding Station, it is hoped to conduct a parallel experiment in Trinidad, to study the effect of intrinsically infertile soils on root development. The results of such a study might have considerable application in the breeding of varieties suitable for such conditions.

An experiment was devised to study the development in time of the root systems of single canes, which were prevented from tillering by removal of the buds from their bases. The complication of the presence of roots from

canes of varying ages in the stool root system was thus avoided. Four varieties—B. 726, B.891, P.O.J. 2878 and Co.281—were used. Young canes were separated from growing stools in July, and planted in boxes after removal of the basal buds, but owing to the difficulty of establishing the canes in the boxes, it was only possible to continue the experiment with two varieties—B.726 and Co.281. The canes were planted in the field in August, but owing to the very dry weather, and also because of the continued protrusion of the aerial buds, growth was unsatisfactory. Two examinations of root development were made in November 1934 and January 1935, and in spite of the artificial conditions under which the canes had developed, some valuable information was obtained. It was found that the roots of individual canes of B.726 have a considerably longer effective life than those of comparable canes of Co.281.

It is hoped to repeat this experiment, with modifications, using a wide range of varietal types, during the coming year.

GUMMING DISEASE INVESTIGATIONS.

These are being continued to test the susceptibility of various seedlings to gumming disease (*Bacterium vascularum* (Cobb) Greig Smith).

Routine weekly observations were made from June 1934 until January, 1935, on the incidence of leaf symptoms of the disease at Dodds in (i) the second year seedling plots, (ii) the multiplication plots of selected seedlings and (iii) the collection of seedlings and imported varieties whose susceptibility to the disease had not previously been recorded. In each case the varietal plots under observation were interplanted with the highly susceptible variety Ba.11569 to provide infective material.

(*a*) *The Inheritance of Gumming Disease Resistance.*

Up to the present time, the susceptibility of more than three hundred varieties to the disease in Barbados is known, and from these figures it is possible to study the inheritance of resistance to the disease by calculating resistance fractions for populations from particular parentages.

This study has direct application in the breeding work, in that crosses which throw a high percentage of susceptible seedlings are eliminated from the breeding programme. An example of this is the cross Ba.11569 x Ba.6032, from which the seedlings show a very high percentage of susceptible individuals. As a result this cross will no longer be made.

(*b*) *The Relationship Between Leaf Symptom Intensities and Systemic Infection (Production of Gum in the Canes).*

Gumming disease manifests itself in two ways in a susceptible variety: (1) leaf symptoms, which are easily recognised in the field, and (2) systemic infection which involves production of gum in the canes, and may result in actual death of canes or interference with sugar manufacturing processes at the factory. The second aspect of the disease is the more serious one from the commercial point of view.

An experiment was conducted in 1933-34 with the object of ascertaining the relationship between these two aspects of the disease, and to find in how far the development of severe leaf symptoms in the field could be taken as indicating the presence of the more serious phase of the disease in a seedling and vice versa. This experiment was described in the Report of the Geneticist for 1933-34, wherein it was indicated that little or no systemic infection occurs in varieties without, or with only slight, leaf symptoms. Hence it would appear safe to choose seedlings for further testing which develop few or no leaf symptoms of gumming disease.

A similar experiment was planted at Dodds in November 1934, with the object of testing these conclusions further during the crop of 1936.

It is hoped to publish a full account of the Gumming Disease Investigations in the near future.

SUGAR CANE FUZZ STORAGE EXPERIMENT.

The object of this experiment is to note whether it is practicable to store sugar cane fuzz—harvested from the breeding plots in December—until July of the subsequent year—a period of approximately nine months—without seriously impairing its germination. Should this be so, it would be possible to plant first year seedlings in the field in November without previously establishing them in nursery plots.

Twenty-one crosses were used, representing a wide range in derivation, and fuzz from these has been subjected to four treatments during the storage period. Sowings will be made in July, when it will be possible to note the effects of storage treatment and the nature of the cross on germination. Samples of fresh fuzz from the same arrows were sown in December for direct comparison.

Storage treatments were as follows:—

(1) Fuzz inserted in sealed containers in a normal atmosphere. This treatment is included as it represents the simplest method.

(2) Fuzz inserted in sealed containers in an atmosphere of carbon dioxide.

(3) Fuzz inserted in sealed containers in a normal atmosphere over calcium chloride.

(4) Fuzz inserted in sealed containers in an atmosphere of carbon dioxide over calcium chloride.

This latter treatment has already been employed successfully in sending fuzz to New South Wales and to Egypt.

EXPERIMENTS WITH THE ZEISS HAND REFRACTOMETER.

The Zeiss Hand Refractometer gives direct refractometric brix readings of very small samples of unclarified sugar cane juice in the field.

Several investigators have obtained high correlations between sucrose in juice obtained by milling, and refractometric brix obtained by this instrument, using particular sampling techniques in the field.

Experiments were begun in the crop of 1935 with the object of assessing the value of the instrument in seedling selection work in Barbados.

Using a particular sampling technique, records were taken of refractometric brix of seedlings during the reaping of the first year seedlings, the second year seedlings and the maturity experiments.

Correlations are being established between these results and the sucrose in juice figures obtained after milling samples of the seedlings at the laboratory.

It is hoped that the instrument will have further use in a detailed investigation of the course of juice improvement of varieties in the maturity experiments.

A full account of these investigations will be published at the conclusion of the work.

II. SWEET POTATO.

A. SEEDLING TESTING.

Further trials were conducted to test the series of seedlings raised in 1932 (q.v. Report of the Geneticist for 1932-33).

The *short crop* seedlings were given a third year's trial at Codrington during the rainy season. This trial included the twenty-eight selections from the previous year's trial, and the controls Red Nut and V.52. Fourteen seedlings were selected in the field, and four of these were eliminated after a cooking test. The remaining ten seedlings were retained, and will be further tested in short crop variety trials.

The *long crop* seedling trial was dug at Pickerings, St. Lucy, in May, 1934. Twelty-four seedlings were selected, and given permanent numbers in the B. series. These seedlings, together with four standard varieties, were included in the third year long crop trial which was planted at Golden Ridge in November 1934. This trial will be dug in May 1935.

B. VARIETY TRIALS.

The *short crop* variety trial was conducted at Balls plantation during the rainy season, and included five seedlings and the variety B.44 (originally obtained from Woodland estate, St. George) together with the standards P.3 (Red Nut) and P.23 (=V.52 from St. Vincent).

The *long crop* trial was dug at Rock Hall, St. Peter, in May, 1934. Cooking tests were carried out, and an investigation made into the behaviour of the varieties under storage conditions, in addition to the recording of crop yields in the field.

The succeeding long crop trial was planted at Ellesmere plantation in November 1934. This will be dug in May, 1935.

As a result of the series of variety trials, the seedling B.5, which has been shown to give a high yield of potatoes of good appearance and cooking quality has been recommended for planting on a commercial scale.

REPORT OF PLANT DISEASES INSPECTOR.

By D. R. D. WILES, D.I.C.T.A.

A. MOSAIC DISEASE OF SUGAR CANE.

The inspection of the cane crop for the presence of the mosaic disease of the sugar cane was systematically carried out by Inspectors in the different parishes of the island. No additional areas were added to the Proclaimed Infected Areas mentioned in previous reports (vide Annual Reports 1927-28, 1928-29, Agric. Journal, Vol. 1 No. 2, 1923 and Vol. 3, No. 2, 1934).

Due to the severe drought and weather conditions experienced during 1934, the Corn Close Season which hitherto had been for a period of 3½ months in the Proclaimed Infected Areas (16th December to 31st March) was fixed for six weeks (15th February 1935 to 31st March 1935). It is hoped that this short period will in no way increase the mosaic infection of the young crop, due to having the host plant of the insect vector of the mosaic disease, *Aphis maidis*, present for a longer period than heretofore.

Cane plants free from mosaic infection were supplied to owners and occupiers in the Proclaimed Infected Areas, under the supervision of an Inspector, from the following centres:—

Parish.	Centre.	Variety.
St. Michael	Waterford	B.2935 and B.726.
St. James & St. Thomas	Molyneux	B.2935 and B.726.
St. George	Groves	B.H.10(12) and B.726.
St. John	Lemon Arbor	B.H.10(12).
St. Joseph	Mt. Wilton	B.H.10(12).

In addition to the above distribution several owners and occupiers in the Proclaimed Infected Areas were allowed to obtain their plants from their own plots after these had been inspected by an officer of the Department, and only three occupiers were refused permission.

Previous to cutting their cane plants several plantations, outside the Proclaimed Infected Areas, had their nursery spots inspected and it is hoped that this inspection will become universal in the near future. Managers are, however, requested to give the Department due notice of the time they are going to commence cutting plants so that the necessary arrangements for inspection can be made.

REPORTS ON INDIVIDUAL PARISHES.

Parish of St. Michael.

On referring to the Comparative Table at the end of this section it will be seen that the number of infected holes found is much higher than in 1933; this was due to a very heavy secondary infection found in the ratoons at Welches,

Weymouth, Goodland and Ivy Tenantries. It is hoped that by the careful rogueing of these diseased stools and by not keeping any ratoons in these areas that the infection will be considerably less. In the remainder of the parish the infection has remained fairly low and a general improvement has been observed especially at Lears and Warrens plantations (vide Agric. Jour., Vol. 3, No. 2, p.40).

Parish of Christ Church.

The mosaic infection in this parish has been observed principally in the tenantries of Enterprise and Pegwell but no infected holes were found in the Lodge Road Tenantry for the period under review. The areas which were removed from the list of Proclaimed Infected Areas three years ago have remained entirely free from infection.

Parish of St. John.

The Proclaimed Infected Areas in this parish have improved beyond expectations, the infection being considerably less both at Wakefield plantation and in Sherbourne tenantry. The heaviest infection has been found in the tenantries of Carter's, Gall Hill and Venture. The infection mentioned in the previous report at Newcastle plantation and Messiah Street tenantry has considerably lessened and it is hoped that these areas will soon be comparatively free.

Parish of St. Joseph.

The areas inspected in this parish were extended during the year and a decided improvement has been observed especially in the Proclaimed Infected Area of Sugar Hill, the infection being present chiefly in the ratoons. As this area is in the ratooning district of the island it is very difficult to bring the infection very much lower immediately but it is hoped that by the distribution of healthy cane plants through the Department and the constant rogueing of diseased stools to have this area much freer from infection than it is at present.

Parish of St. Lucy.

As only two infected holes were found during the inspection period of 1933-34 in this parish, it was decided to cease inspections thereby enabling inspections to be carried our more fully in the parishes of St. Andrew and St. Joseph.

Parish of St. Peter.

The mosaic infection observed in this parish has been confined to the Road View and Farm Road tenantries and as the infection appears to be on the increase it is very likely that this area will have to be replaced on the list of Proclaimed Infected Areas. It is pleasing to report that no infected holes were found on any estate in this parish.

Parish of St. James.

The increase in the number of mosaic diseased stools found in this parish for the period under review is due to the discovery of a very heavy infection in the

ratoon canes at Lancaster plantation, displaying the typical symptoms of secondary infection. This estate which has been in the Proclaimed Infected Area since 1927 had shown considerable improvement there being very few infected holes in the plant canes and it is hoped that by the constant rogueing of diseased stools and decreasing the area planted in ratoons that the infection will be considerably less. A general improvement has been observed in Greenwich Village which was placed on the list of Proclaimed Infected Areas last year for the first time. The remainder of the parish shows considerable improvement and in many of the Proclaimed Infected Areas no diseased stools were observed.

Parish of St. Thomas.

The mosaic infection in this parish has considerably reduced, no doubt, due to the constant rogueing of diseased stools and the proper selection of healthy cane plants at planting time, this refers especially to those areas of infection which were located during the inspections of 1932. Rock Hall tenantry has continued to improve and it is hoped that this area will soon be entirely free thereby allowing it to be removed from the list of Proclaimed Infected Areas.

Parish of St. George.

Inspections in this parish were extended during the year and it was found that the disease was at present scattered throughout the parish especially in the tenantries. The Proclaimed Infected Areas have shown a decided improvement and at one place on the list no infected holes have been found for three years; this will be removed during the coming year. It is hoped, however, that by the removal of the infected holes and the supply of healthy cane plants that the number of diseased holes will be considerably less.

Parish of St. Andrew.

Inspections in this parish were carried out on a much more extended scale than heretofore due to the inspections in the parish of St. Lucy having ceased thereby allowing an Inspector to be appointed for this area. Ninety diseased holes were found in the acreage inspected and it is hoped that this parish will soon be entirely free of infection.

The total number of diseased holes for the period under review were destroyed to the satisfaction of the Inspectors who received the co-operation of all owners and occupiers so much so that there were no complaints for breaches of the Mosaic Disease(Eradication) Act.

COMPARATIVE TABLE SHOWING THE ACREAGES INSPECTED AND THE MOSAIC DISEASE INFECTION FOR THE YEARS 1931, 1932, 1933 and 1934.

Parish.	1931.		1932.		1933.		1934.	
	Acreage Inspected.	Number of Infected Holes.	Acreage Inspected.	Number of Infected Holes.	Acreage Inspected.	Number of Infected Holes.	Acreage Inspected.	Number of Infected Holes.
St. Michael ...	2,995½	2,748	2,979½	3,561	3,231¼	3,511	2,647	7,306
Christ Church...	4,001¼	294	4,062	646	3,591¾	419	3,554¼	369
St. Lucy ...	2,170¼	99	2,435¾	107	2,072¾	2	89½	0
St. Peter ...	2,159	13	2,581	10	2,255¾	328	1,833¾	449
St. James ...	1,644	563	1,850	550	1,250¼	1,802	1,569½	2,066
St. Thomas ...	1,449¾	2,260	1,498	4,087	1,627	668	952¾	91
St. Joseph ..	254¼	284	170¾	48	226½	6,334	423½	2,420
St. George ...	2,806½	3,481	2,608¾	3,626	1,941¾	2,145	2,773	2,368
St. John ...	1,734¼	10,024	2,074¼	2,145	1,914¼	1,529	1,478	1,245
St. Andrew ...	–	–	–	–	–	–	1,250¾	90
Total ...	19,214¾	19,766	20,260	14,780	18,111¼	16,738	16,572	16,404

B. GUMMING DISEASE OF THE SUGAR CANE.

Wherever the variety Ba.11569 was planted the leaf symptoms of this disease were observed. Many of the other varieties also showed the typical leaf symptoms but not to the same extent as the Ba.11569. Fortunately no factories have reported any difficulty in the manufacture of sugar from these affected canes.

C. INSPECTIONS UNDER THE COTTON DISEASES PREVENTION ACT.

The old cotton fields were inspected thoroughly during the Cotton Close Season which extended from May 1st to July 31st, 1934, so as to ensure that they had been properly cleared of cotton plants, refuse cotton etc., and only two offenders were found against whom complaints had to be lodged.

The Okra Close Season was again proclaimed to extend from the 16th April, 1934, to the 15th May, 1934, and as in previous years permits were issued to growers who were wishful of keeping okras as vegetables. Inspection of these plots was carried out during the close season and occupiers willingly cooperated with the Inspectors by keeping their plots free from all old fruit.

Selected cotton seed was distributed for planting from 1st August, 1934, but due to the drought which existed throughout the year a poor stand was obtained, the young seedlings dying off after an excellent germination had been obtained. The total area which has been kept and allowed to bear being about 470 acres. The yield of the crop planted in 1933 and reaped in 1934 realised 1,555 lb. of lint.

The Peasants' Cotton Plot Competition was again held in conjunction with the Peasants' Agricultural Exhibition and the premier award again went to the first prizewinner of 1932, this being the third year that he has been successful; the reason being that he has carefully followed the instructions laid down by the Department of Agriculture for planting cotton.

Owing to the planting season for cotton being a month earlier than the year before an earlier search was made for the presence of the pink bollworm (*Pectinophora gossypiella*, Saund.) and its appearance was discovered in the parish of St. Philip on the 23rd November 1934 and in the parish of St. Lucy on the 27th November 1934. It does not appear as if the attack of the pink bollworm has affected the yield to any appreciable extent because the early attack appeared to be fairly slight and yields varying from 500 lb. to 800 lb. of seed cotton per acre have been obtained under estate conditions. There are, however, a few instances where the yield has exceeded 1,000 lb. of seed cotton per acre. The trees are now in bloom for the second bearing and from their general appearance it would seem as if a fair yield will be obtained provided the attack of pink bollworm is slight.

For the period under review the holds of 18 ships were fumigated with Zyklon B and 9,843 bags of imported cotton seed were disinfected in the Simon's Heater.

D. MISCELLANEOUS INSPECTIONS.

529	packages of Bulbs, Rose Trees, Vegetable and Flower Garden Seeds	Examined and Passed.
1	pkg. Hibiscus Cuttings	,, ,, ,,
2	cases Palms	,, ,, ,,
4	,, Bulbs	,, ,, ,,
6	pkges ,, ...	,, ,, ,,
20	Orchids	,, ,, ,,
13	cases Orchids	,, ,, ,,
3	pkges ,, ...	,, ,, ,,
1	box ,, ...	,, ,, ,,
112	Citrus Plants	,, ,, ,,
1	pkg. Citrus Plants	,, ,, ,,
2	Vanilla Plants	,, ,, ,,
2	Mora Plants	,, ,, ,,
1	box Bamboo Plants	,, ,, ,,
1	case Onion Seed	,, ,, ,,
23	Geranium Plants	,, ,, ,,
1	pkg. Carnation Plants	,, ,, ,,
1	pkg. Begonia Plants	,, ,, ,,
4	cases Rose Trees	,, ,, ,,
7	pkges. ,, ,, ...	,, ,, ,,
1	bag Pineapple Suckers	,, ,, ,,
5	Ferns	,, ,, ,,
1	pkg. Ferns	,, ,, ,,
3	Breadfruit Plants	,, ,, ,,
33	Mango Plants	,, ,, ,,
16	Coconut Plants	,, ,, ,,
2	boxes Miscellaneous Plants	,, ,, ,,
1	crate ,, ,, ...	,, ,, ,,
1	barrel ,, ,, ...	,, ,, ,,
5	pkges. ,, ,, ...	,, ,, ,,
9	Plants ,, ...	,, ,, ,,
9	Palms	Roots Washed.
16	Mango Plants	,, ,,
9	Miscellaneous Plants	,, ,,
1	box ,, ,, ...	,, ,,
2	pkges. Bulbs	,, ,,
3	Fir Trees	,, ,,
2	Begonia Plants	,, ,,
1	Geranium Plant	,, ,,
3	Mango Plants	Destroyed.
27	Coconut Plants	,,
1	pkg. Coconut Plants	,,
3	Miscellaneous ,, ...	,,
1	Sugar Cane	,,

APPENDIX I.

Meteorological Observations Recorded at the Meteorological Station, Codrington.

HEIGHT ABOVE SEA LEVEL 181 FEET.

Latitude 13°7′ 36″ *N.* *Longitude* 59°35′ 57″*W.*

The following are summaries of the observations recorded for the year 1934. The details are given in Appendix II.

Barometric Pressure. The records refer to observations made at the hours of 9.00 a.m. and 3.00 p.m. only and are expressed in inches of mercury. During the year 1934 the mean pressure corrected for temperature and gravity and reduced to sea-level was at 9.00 a.m. 29.985, and at 3.00 p.m. 29.913, the highest pressure recorded being 30.103 at 9.00 a.m. on February 27th, and the lowest 29.737 at 3.00 p.m. on November 26th. For the ten-year period 1924-1933 the average barometric pressure was at 9.00 a.m. 29.973 and at 3.00 p.m. 29.897. The highest pressure recorded at 9.00 a.m. during the ten-year period was 30.127 inches on January 22nd, 1925, and the lowest pressure recorded at 3.00 p.m. was 29.704 on October 30th, 1929.

Temperature. The daily mean maximum temperature for the year 1934 was 85.3°F. and the daily mean minimum 72.0°F. The maximum extreme for the year was 90.0°F. registered on September 1st, 2nd and 4th and the minimum extreme was 64.0°F. registered on February 18th. The average daily mean temperature was 78.6°F., the highest monthly range 20.0°F., and the lowest 16.5°F., the mean monthly range being 18.1°F. For the ten-year period 1924-33 the daily mean maximum was 85.5°F., and the daily mean minimum 72.6°F. During the ten-year period the average daily mean temperature was 79.0°F., the maximum extreme was 91.5°F. on August 23rd, 1927, the minimum extreme 63.0°F. on February 18th, 1932 and the average monthly range 18.5°F.

Tension of Vapour and Relative Humidity. The mean tension of vapour for the year 1934 was at 8.00 a.m. .733 and at 5.00 p.m. .708. The mean relative humidity was at 8.00 a.m. 72.6% and at 5.00 p.m. 68.9%.

Wind. The daily (24-hour period) mean velocity of the wind during the year 1934 was 11.5 miles an hour. Records were kept of half-daily or 12-hour periods from 6.00 a.m. to 6.00 p.m. and 6.00 p.m. to 6.00 a.m. The maximum velocity for any such 12-hour period was 22.8 miles an hour, recorded between 6.00 a.m. and 6.00 p.m. on February 26th, and the minimum velocity was 3.5 miles an hour recorded between 6.00 p.m. and 6.00 a.m. on August 20th. The average daily (24-hour period) velocity for the ten years ended 1933 was 9.5 miles an hour.

Rainfall. The rainfall measured at the Government Meteorological Station during the year 1934 amounted to 34.62 inches. Rainfall was recorded on 208 days, the greatest fall being 2.74 inches on September 7th. For the ten-year period 1924-1933 the average rainfall was 51.18 inches and the average number of days annually on which rain fell was 203.

Rainfall of the Island. The average total rainfall for the year 1934 from 150 stations was 39.70 inches, being 20.52 inches below the average for the eighty-seven years ended December 31st, 1933, which was 60.22 inches.

APPENDIX II.

METEOROLOGICAL REPORT FOR 1934.

DEPARTMENT OF AGRICULTURE, BARBADOS.

Height Above Sea-Level 181 *feet.*

Months.	Mean Pressure reduced to 32° Fahrenheit, Latitude 45° and Mean Sea Level.					Temperature °F.								Tension of Vapour.			Relative Humidity					
	9 a.m.	3 p.m.	Mean.	Highest.	Lowest.	Max. Mean.	Min. Mean	Max. Extreme.	Min. Extreme	Mean for Month	Range for Month.	Dew Point 8 a.m.	Dew Point 5 p.m.	8 a.m.	5 p.m.	Mean.	8 a.m.	5 p.m.	Mean.	Velocity miles per hour.	Rainfall.	No. of Days on which rain fell.
January ...	29·934	29·914	29·924	30·066	29·834	81·6	69·9	83·0	65·5	75·7	17·5	68·2	66·5	·691	·651	·671	78·0	71·2	74·6	13·0	2·48	19
February ...	30·042	29·956	29·999	30·103	29·895	82·6	68·0	84·0	64·0	75·3	20·0	65·7	64·5	·634	·605	·619	71·5	65·1	68·3	12·1	1·02	18
March	30·012	29·932	29·972	30·071	29·859	84·1	68·8	85·0	65·0	76·4	20·0	64·5	63·5	·607	·586	·596	64·6	60·3	62·4	11·6	·22	6
April	30·027	29·945	29·986	30·072	29·878	85·6	71·4	87·0	68·0	78·5	19·0	66·3	66·1	·644	·642	·643	63·2	62·7	62·9	12·7	·52	9
May	29·997	29·926	29·961	30·040	29·839	85·5	72·5	87·0	70·5	79·0	16·5	69·0	68·4	·713	·696	·704	69·3	67·5	68·4	13·2	2·69	17
June	30·002	29·935	29·968	30·051	29·867	87·0	73·9	88·5	70·5	80·4	18·0	69·0	69·1	·708	·713	·710	64·9	65·2	65·0	12·9	1·32	12
July	30·000	29·941	29·970	30·033	29·901	87·1	74·3	89·0	71·5	80·7	17·5	71·6	70·4	·780	·743	·761	74·3	67·4	70·8	12·6	3·35	22
August	29·994	29·923	29·958	30·052	29·868	88·5	74·3	89·5	72·0	81·4	17·5	72·7	71·1	·804	·765	·784	75·4	68·6	72·0	10·7	2·65	22
September ...	29·954	29·885	29·920	30·016	29·804	86·5	73·8	90·0	70·0	80·1	20·0	73·1	72·2	·814	·795	·804	75·0	74·3	74·6	9·1	9·08	22
October ...	29·958	29·872	29·915	30·032	29·826	85·8	73·5	88·0	71·5	79·6	16·5	73·6	72·0	·831	·786	·808	79·4	73·1	76·2	8·6	4·47	18
November ...	29·916	29·831	29·873	29·972	29·737	85·9	73·1	87·0	69·5	79·5	17·5	73·0	71·5	·814	·777	·795	77·1	75·3	76·2	8·6	2·39	17
December ...	29·991	29·905	29·950	30·042	29·872	83·3	71·5	85·0	67·5	77·4	17·5	70·7	70·2	·755	·747	·751	78·6	76·9	77·7	12·8	4·43	26
Average ...	29·985	29·913	29·949	30·045	29·848	85·3	72·0	86·9	68·8	78·6	18·1	69·8	68·8	·733	·708	·720	72·6	68·9	70·7	11·5	34·62	208

APPENDIX III.

SUMMARY OF BARBADOS RAINFALL FROM JANUARY TO DECEMBER, 1934.

NAME OF STATION.	No. of Stations	January		February		March		April		May		June		July		August		September		October		November		December		Total	
		Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches
DISTRICT "A".																											
St. Michael Lowlands	15	15	2·34	10	·97	6	·42	6	·42	13	2·58	7	1·50	15	3·03	17	2.88	17	8·13	15	4·26	13	3·03	20	4·10	154	33·66
DISTRICT "B".																											
Christ Church Lowlands	16	15	2·66	8	·70	6	·62	5	·42	14	2·66	7	1·71	16	3·41	18	3·88	16	7·51	15	4·43	12	3·30	19	4·40	151	35·70
St. George Highlands	10	17	3·93	13	1·64	7	·89	7	·85	14	3·24	12	2.38	18	4·59	19	4·06	20	8·00	19	6·14	13	4·29	22	5·76	181	45·77
Lowlands	13	15	2·95	8	1·00	5	·42	6	·60	11	3·00	8	1·95	16	4·05	17	3·93	16	8·30	15	4·90	11	3·24	19	5·02	147	39·36
DISTRICT "C".																											
St. Philip Highlands	3	10	2·27	6	·83	3	·20	6	·59	10	1·63	12	1·84	17	3·70	15	2·50	16	5·34	17	3·68	11	4·53	22	5·53	145	32·64
Lowlands	18	13	2·20	7	·67	5	·38	5	·35	10	1·90	9	1·81	17	3·82	17	2·85	16	6.44	15	3·62	11	3·76	20	4·67	145	32·47
St. John Highlands	12	16	3·38	12	1·35	7	·67	7	·82	15	3·56	14	1·93	19	4·81	20	3·84	18	6·08	18	5·33	14	5·04	21	6·71	181	43·52
Lowlands	4	9	2·05	5	·80	3	27	4	·52	9	2·92	8	.90	13	3.93	14	2·97	15	4·92	15	3·86	11	5·60	19	4·86	125	33·60
DISTRICT "D".																											
St. Thomas Highlands	9	19	4·22	12	1·73	8	·81	9	1·50	16	5·10	14	2·72	20	5·71	20	4·62	17	6·39	20	6·85	15	6·72	23	7·37	193	53·74
Lowlands	8	17	3·47	10	1·24	5	·46	7	·80	13	3·61	9	2·02	16	3·89	18	3·74	18	5·85	18	5·58	12	4·36	21	5·57	164	40·59
St. James Highlands	1	13	4·37	9	1·42	9	·98	10	2·33	15	5·63	14	2·76	18	6·99	17	6·51	16	8·44	16	5·78	14	7·03	21	9·79	172	62·03
Lowlands	9	16	2·75	8	·94	6	·54	6	·65	12	2·74	8	1·54	17	3·17	17	3·60	16	5·14	18	5·23	12	4·29	22	5·03	158	35·62
DISTRICT "E".																											
St. Peter Highlands	6	11	3·30	4	·63	4	·64	5	·92	7	2·57	8	1·45	15	3·57	14	4·17	13	4·00	15	3·97	18	5·18	18	6·33	127	36·73
Lowlands	6	16	3·83	8	·86	8	1·01	7	1·02	11	2·46	9	1·52	17	4·10	18	4·03	16	4·30	16	4·10	12	3·00	20	6·11	158	36·34
St. Lucy Lowlands	7	12	2·88	6	1·05	3	·36	4	·54	9	2·11	8	1·15	14	2·32	13	2·73	13	4·03	12	3·37	10	3·70	18	5·68	122	29·92
DISTRICT "F".																											
St. Joseph Highlands	5	18	3·40	12	1·58	9	·88	8	1·28	16	4·79	12	2·00	19	5·06	20	4·63	18	6·00	20	5·84	14	5·22	23	6·54	189	47·22
Lowlands	2	13	3·25	11	2·11	5	·59	6	1·21	8	3·25	8	1·63	15	4·32	17	4·80	16	7·05	13	6·72	10	5·05	17	7·08	139	47·06
St. Andrew Highlands	4	12	2·88	5	·61	3	·38	4	·65	8	2.79	7	·99	15	3·58	17	4·17	14	4·17	16	4·53	13	4·82	20	6·13	134	35·70
Lowlands	2	10	2·66	5	·49	4	·46	4	38	5	2·13	6	·86	15	2·43	15	4·13	14	3·68	16	4·44	13	5·52	17	5·34	124	32·52
Total	150	267	58·79	159	20·62	106	10·98	116	15·85	216	58·67	180	32·66	312	76·48	323	74·04	305	113.77	309	92·63	234	87·68	382	112·02	29·09	754·19
Average		14	3·09	8	1·09	6	·58	6	83	11	3·09	10	1.72	17	4·03	17	3·90	16	5·99	16	4·87	12	4·61	20	5·90	153	39·70

PEASANTS' AGRICULTURAL EXHIBITION.

The usual exhibition for peasants was held in Queen's Park on November 28th, 1934. Once again the exhibition showed conclusive evidence of the improvement in the standard of the exhibits which, in all classes, were without exception, of excellent quality.

PLANT INTRODUCTION AND DISTRIBUTION.

The importation of seeds of various ornamental flowering trees and shrubs was continued during the year.

The distribution of plants during the year was as follows:—

(a)	Ornamental Flowering Trees ..	96
(b)	Ornamental Foliage Trees ..	744
(c)	Other Ornamental Plants ..	573
(d)	Fruit Trees	41
(e)	Arbor Day Free Distribution ..	4,923
(f)	Palms	78

SECTION III.

FINANCIAL STATEMENT.

EXPENDITURE AND REVENUE.

Expenditure.

Personal Emoluments	£7,510	11	8
Travelling Allowances	955	4	7
Exhibition Expenses	136	7	10
Expenses in Control of Sugar Cane Mosaic Disease ..	1,579	16	11
Expenses in Control of Pink Bollworm of Cotton (Salaries of Sub-Inspectors of Plant Diseases)	150	0	0
Experiment Stations and Botanic Station	1,635	9	2
Chemical Laboratory	753	5	0
Entomology	367	6	11
Science Teaching at Harrison College	1,079	18	6
Veterinary Services	235	9	6
Analysis of Commercial Sugars and Molasses	606	5	4
Seed Distribution	84	17	9
Purchase of Motor Lorry	200	0	0
Unforeseen Contingencies	34	3	3
Sundries	277	13	9
Total	15,606	10	2

Revenue.

Sale or Ornamental Plants	£ 29	14	6
Sale of Produce from land leased by Department ..	188	7	3½
Sale of Cane Plants under Mosaic Disease Eradication Act	83	11	3
Fees for Analysis of Sugar and Molasses	1,852	17	0
Fees for Analysis of Miscellaneous Samples	76	19	0
Fees for Fumigation of Schooners, etc.	15	8	9
Miscellaneous Receipts	55	11	3
Total	2,302	9	0½